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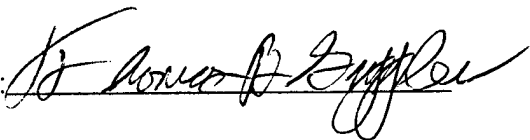
NOT WITHOUT RISK:  
OPERATIONAL ANALYSIS OF A LANDMINE BAN

by

Thomas Barry Supplee  
Major, US Army

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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A debate has developed in the professional and academic journals over the utility of landmines in military operations from one perspective versus the necessity of a landmine ban for humanitarian reasons from the other. Much of the available literature examining the impact of a landmine ban fails to analyze the issue from an operational perspective. This study will review the available literature but attempt to maintain an operational focus by consistently returning to the operational link among ends, ways, means and risk. Based on an analysis considering ends, ways, means, and risk, the operational commander can logically determine how to respond to a total ban on anti-personnel landmines and, in the process, identify the associated risk.

The key to successfully reconciling the tactical and strategic perspectives resides at the operational level of war, because it is at the operational level that available military means are applied to achieve strategic ends. While an operational analysis of the impact of a landmine ban can identify alternative mechanisms, none of these alternatives are without associated risk. In every case, when landmines are removed from the operational equation some degree of risk must be identified and accepted.

## INTRODUCTION

"Mines are weapons. Every one that has ever met any on a land battlefield or at sea, knows that they are terribly effective. Sometimes they cause casualties, often they destroy equipment, most of the time, they cause an important waste of time, always they have a powerful psychological impact. They are an insidious threat." Gerard Gambiez<sup>1</sup>

The opening quotation from a French Infantry Colonel and student at the US Army War College makes almost poetically clear; there can be little debate about the tactical effectiveness of mine warfare. For ground combat forces, landmines are a critical consideration in planning and conducting missions. From the tactical perspective, unit leaders understand that "friendly" mines can be employed to protect and defend US forces while canalizing, delaying, disrupting, and attriting enemy forces. "Enemy" mines pose similar threats to US forces. At this level landmines are subcategorized into antipersonnel or antitank, conventional or scatterable and even selfdestructing and non-selfdestructing. Both the threat of enemy landmines and the value of friendly landmines are quickly accepted in early training, and additional training progresses through practice of avoiding the threat and effectively employing an array of friendly mines. The fact that the Claymore mine "projects a fan-shaped pattern of steel balls in a 60-degree horizontal arc and covers a casualty radius of 100 meters"<sup>2</sup> is more a cause for reassurance than concern for leaders at the tactical level.

"Finally, we must end the carnage caused by antipersonnel landmines, the hidden killers that murder and maim more than 25,000 people a year. In May I announced a series of actions the United States would take toward this goal. Today I renew my appeal for the swift negotiation of a worldwide ban on the use, stockpiling, production, and transfer of antipersonnel landmines. Our children deserve to walk the Earth in safety." President Clinton<sup>3</sup>

In the current political climate landmines have become an issue for policy makers. Most recently, the "carnage caused" by these "hidden killers" have raised a crescendo of discussion at the political level about the humanitarian suffering caused by landmines. "Between 80 to 110 million of these weapons are scattered in 64 countries. They claim 500 victims every week. They do not distinguish between civilians and combatants; indeed, they probably kill

more children than soldiers."<sup>4</sup> In 1996 the US unilaterally banned (almost, there are exceptions for training and for US forces in Korea) the use of non-selfdestructing antipersonnel landmines. While this new policy is not the comprehensive and global ban on antipersonnel landmines referred to in the President's address to the United Nations, it certainly begins the process of constraining military commanders. In December, 1997, 120 Nations signed a comprehensive treaty in Ottawa to ban the production and use of all antipersonnel landmines. The US did not sign the treaty but did participate in the process as an observer. Although the US did not sign the Ottawa Treaty in 1997, a global ban on antipersonnel landmines remains a Presidential policy objective, and some policy makers are pushing for a complete ban on all landmines.

"...even when used on a massive scale, they have usually had little or no effect on the outcome of hostilities. No case was found in which the use of anti-personnel mines played a major role in determining the outcome of a conflict." Patrick Blagden<sup>5</sup>

This quote from a retired British Brigadier and former U.N. demining expert, though controversial in its conclusion, clearly defines an operational perspective in the landmine debate. The tactical perspective focuses too narrowly on the utility of landmines, but policy makers must be informed of the impact of a ban. The key to successfully reconciling the tactical perspective, landmines as an employment asset, with the strategic perspective seeking a ban on antipersonnel landmines resides at the operational level of war. What is the "effect on the outcome of hostilities", or would landmines play a "major role in determining the outcome of a conflict?" Because it is at the operational level that available military means are applied to achieve strategic ends, the operational commander is the key to reconciling the tactical utility of landmines with a strategic ban on their use, and, in the process, identifying risk.

The operational commander, CINC or JFC, must consider the impact of constraining military operations to comply with a total ban on the use of antipersonnel landmines. The commander's analysis can logically follow the same flow as the four operational assessment questions; ends, ways, means and risk. The commander is charged with producing some

military condition in support of the strategic objective. What is the significance of a ban in light of the military conditions that the operational commander must produce? The commander designs an operational scheme to produce the desired end. What is the impact of a ban on the operational scheme employed by the commander? In light of a ban, however, the commander has one less means, landmines, available for application in the operational scheme. The commander must identify alternative means or change the scheme. What alternative operational mechanisms or means are applicable? Some degree of risk will be incurred by these changes. What is the likely cost or risk caused by changes due to a landmine ban? Based on an analysis considering ends, ways, means, and risk, the operational commander can logically determine how to respond to a total ban on anti-personnel landmines and, in the process, identify the associated risk.

Much of the available literature examining the impact of a landmine ban fails to analyze the issue from an operational perspective. This study will review the available literature but attempt to maintain an operational focus by consistently returning to the operational link among ends, ways, means and risk.

#### DOCTRINAL IMPACT OF A BAN

Doctrine charges joint force commanders with providing a range of military options in support of national strategic objectives.<sup>6</sup> This range extends through a spectrum of conflict from large-scale and sustained combat during war to combat or non-combat operations during a variety of Operations Other Than War. The military commander cannot simply plan every operation to fight and win. The range of options required of military forces translates into a variety of military conditions that the commander must produce in order to achieve the strategic goal.

At the high end of the spectrum of conflict the general strategic goal is to fight and win. Toward this end, an operational scheme is generally devised to defend, reinforce, attack, withdrawal, or delay. Joint Pub 3-15, Doctrine for Barriers, Obstacles, and Mine Warfare,

groups these operations into offensive and defensive in order to describe the employment of landmines.<sup>7</sup>

In defensive operations "the priority for barrier, obstacle, and minefield emplacement is directed toward degrading the enemy's ability to maneuver. A secondary objective is to destroy or attrit the enemy force. Other objectives include the support of economy of force measures and the retention of key terrain or areas of significant political, strategic, operational or tactical value."<sup>8</sup> The defending commander employs landmines and other obstacles to shape the movements of the enemy. The intent may be to cause the enemy to concentrate forces at a particular place and time on the battlefield or to disrupt or delay enemy maneuver. In some cases landmines are employed to shape the battlefield in order to deny enemy access to decisive points on the battlefield and provide protective barriers around friendly forces. Landmines employed in defensive operations are also expected to destroy or attrit enemy forces, and landmines are considered force multipliers because of this increased lethality in an economy of force.

In the offense "the priority for barrier, obstacle, and minefield emplacement, to include air-delivered scatterable mines, is to enhance and protect the friendly force's ability to maneuver. This is achieved by controlling the movement of enemy ground and naval forces and degrading the operability of enemy airbases. The enemy's ability to counterattack or reinforce is restricted and the area of operations is isolated."<sup>9</sup> The commander conducting offensive operations must rely on a more agile use of landmines and other obstacles to shape the movements of the enemy. The intent in offensive operations may be to prevent the enemy from concentrating forces for a counterattack or to otherwise disrupt or delay enemy maneuver. Landmines are employed to shape the battlefield in order to deny enemy reinforcement of the objective area. Ideally, forces conducting offensive operations are protected along exposed flanks by a very agile use of landmines.

With one exception, doctrine does not distinguish employment of landmines during operations other than war. The exception is found in Joint Pub 3-15, "Before hostilities,

barriers, obstacles, and minefields can enhance deterrence without posing an offensive threat. Defensive employment along a hostile land border can demonstrate friendly resolve."<sup>10</sup> Additional, non-doctrinal ideas on the employment of landmines during operations on the lower end of the spectrum of conflict include primarily deterrence and economy of force. Landmines can add credibility to forces otherwise lacking in combat power. "Mines will be a key antiarmor element for early deploying troops establishing a lodgement pending assembly of a fully capable force."<sup>11</sup> Landmines can be critical force multipliers for forces lacking other supporting assets. "Insurgent forces make extensive use of mines, mainly as an economy of force measure."<sup>12</sup>

To summarize the doctrinal impact of a landmine ban at the operational level; operational commanders employ landmines in defensive operations principally to shape the movement of enemy forces, protect friendly forces and locations, attrit enemy forces, and to increase lethality in an economy of force. In offensive operations landmines are employed to shape the movement of enemy forces and to protect friendly force formations. In operations other than war, landmines can be employed for deterrence and in an economy of force.

### HISTORICAL SIGNIFICANCE OF LANDMINES

To maintain operational level focus, the historical review looks at the ways in which landmines have been employed rather than the history of landmine development. Ways are linked to the strategic ends desired by looking across the spectrum of armed conflict from war through operations other than war.

US forces have consistently employed landmines when conducting combat operations at the high end of the spectrum of conflict, war. Modern experience with landmines is appropriately traced to the period immediately preceding US entry into WWII. "The leadership of the U.S. Army gave little attention to mine and countermine warfare before 1939."<sup>13</sup> "The origin of current mine warfare doctrine and practice really comes from the widespread use by all combatants in World War II. In the battle for Kasserine Pass in February 1943, mines placed by the U.S. Army had the desired effect of slowing the Axis advance,



though only temporarily....Similar examples can be found throughout both theaters. At El Alamein, Kursk, Normandy, Anzio and literally hundreds of places, mines were used to defend with some degree of success."<sup>14</sup>

Most military leaders of this period considered landmines to be cheap, effective and purely a defensive weapon. Landmine warfare in North Africa mid-1941 to mid-1943 provides an important historical case because the adversaries laid an extensive number of mines. The Germans laid approximately 500,000, at Alamein in October 1942. Although German laid minefields are credited as significantly stiffening the German defenses, particularly at the Second Battle of El Alamein, an indisputable conclusion from a study of their operational impact in North Africa is that the operational defense invariably failed. While landmines were effectively used by the defender to limit the mobility of the attacker, the attacker was consistently able to overcome the operational defenses.<sup>15</sup>

As the Allies opened new combat operations aimed at knocking Italy out of the war, the Germans demonstrated an agile ability to delay the Allies while effectively withdrawing German forces. While the Allies synchronized amphibious warfare and mass along the coasts, the Germans integrated demolition and landmines into a flexible defense inland. At the operational level the Germans were able to utilize landmines in a successful delay. "By 1944, the Allies in Italy had come to associate either 'substantial resistance or delaying action' on the part of the Germans with their ability 'to lay substantial minefields.'"<sup>16</sup>

The Germans again integrated extensive use of landmines into their defenses along the Atlantic Wall and against the subsequent Allied drive toward Germany. The mines seriously reduced Allied mobility and inflicted significant casualties on the Allied forces, but again the German operational defense was a failure.

In the Pacific Theater the Japanese initially faced a significant landmine threat against the British in Malaya. When the Japanese shifted over to the operational defensive in mid-1943, they began to emphasize landmine warfare as a means to delay the Allied advance. By far the most significant use of landmines by the Japanese took place in the defense of Okinawa. Even

these relatively vast antitank minefields, though credited with 29% of US tanks immobilized or destroyed, ultimately failed to halt US forces.

US forces conducted landmine warfare in Korea from 1950-1953. US forces on the offensive in Korea demonstrated what has become a characteristic reliance on overwhelming firepower but without significant use of landmines. The most significant use of landmines occurred as the war stabilized after February 1951 around the 38th Parallel. Both sides used landmines integrated into their operational defense as the conflict stalemated. Chinese forces employed predominately antitank mines while US and UN forces relied heavily on antipersonnel mines. "In May 1951, the engineers along the front of one U.S. Infantry Division laid ... the substantial total of 7,490 antipersonnel mines compared with approximately 100 antitank mines."<sup>17</sup> US forces faced overwhelming numerical superiority and came to rely on landmines as a critical force multiplier. "In the Korean war, US commanders confronted the nightmare of seeing their forces overrun by hordes of enemy soldiers. Rising to the challenge, US weapons laboratories reexamined the design of the army's munitions to see if their casualty-producing efficiency could be improved. The result was a revolution in antipersonnel weapons design."<sup>18</sup> "American military might had been challenged by an enemy, technologically inferior but with inexhaustible reserves of manpower.... Superior technology must defeat superior manpower."<sup>19</sup>

During operation Desert Shield, US forces again employed landmines as an economy of force measure while forces were being deployed in order to build combat power in Saudi Arabia. The Coalition used mines during the build-up phase, Desert Shield, and then faced a significant Iraqi landmine obstacle during offensive operations in Desert Storm. While the integration of landmines into the defense of Saudi Arabia was never tested by Iraqi forces, clearly the Iraqi use of landmines was unsuccessful in defending against attacking Coalition forces.

US Forces employed large numbers of air delivered, antipersonnel mines in an area denial role in Vietnam. "Once available, air-delivered antipersonnel mines were dropped in huge

numbers, largely against unseen targets."<sup>20</sup> In addition to the extensive employment of this new family of scatterable mines in Laos in an ultimately futile attempt to block the Ho Chi Minh trail, US commanders employed the mines in other versions of area denial intended to canalize enemy personnel movement.

The stalemate that US forces faced in Korea in 1951-1953 was a prelude to the long term use of landmines along the Demilitarized Zone. Landmines employed along the DMZ in Korea and around Guantanamo Bay Naval Base have been integrated into the defenses along these demarcations but are primarily employed for deterrence. "In cases where mines have created a long-term barrier, they have rarely been challenged and have been effective."<sup>21</sup>

"Where land-mines have tended to be used most in recent months is in irregular wars, in an irregular fashion and by irregular forces. Of the twelve British soldiers killed in Bosnia, up to mid-1995, ten were killed by land-mines."<sup>22</sup> In operations at the low end of the spectrum, involving only limited combat such as peacekeeping or no combat such as humanitarian assistance, US forces have not made significant operational use of landmines. "Indeed, in many such operations, U.S. forces will be prohibited by the prevailing rules of engagement from employing landmines at all -- in Somalia, for example, U.S. forces used no mines (but did spend considerable effort, and lost some lives, dealing with hostile mines laid by indigenous forces)."<sup>23</sup>

To summarize the historical significance of landmines; during WWII landmines were employed principally in the defense and in delaying operations. Landmines were used to shape the movement of enemy forces, protect friendly forces and locations, and to increase the lethality of an economy of force. "Nevertheless, history has shown that mines can only act as delaying elements, and have never yet stopped a determined advancing enemy."<sup>24</sup> Defensive minefields on this scale can be associated with attrition warfare,<sup>25</sup> and clearly the use of landmines in delaying operations has proven more successful than in the defense. "The effective use of mines will 'buy time' for the user, will create an annoyance (nuisance) for the enemy (and for friendly forces as well), but have never played a decisive role in the

determination of the final outcome of any major war."<sup>26</sup> In Korea, US forces relied heavily on landmines as force multipliers against a numerically superior enemy. Landmines were again relied on as force multipliers, and for credibility, during the build-up for Desert Shield. In Vietnam, US forces tried unsuccessfully to deny movement in some areas with extensive use of landmines. In non-combat operations other than war, US forces have employed landmines as fixed barriers for deterrence.

### MILITARY UTILITY AND ALTERNATIVE MECHANISMS

In their OSD commissioned study on the military utility of antipersonnel landmines, the Institute for Defense Analysis argues that the debate over the utility of landmines thus far has been based on the assumptions that US forces would be on the operational defense in a high intensity conflict. The study focuses on four principal uses for landmines based on these assumptions; to provide economy of force, to canalize attacks, to increase attacker losses, and to reduce defender casualties. Although the authors of the report are careful to question the validity of the underlying assumptions, they subsequently base their conclusions on models and simulations built around them. Additionally, the models used in the study assume a very dynamic type of defense involving numerous tactical offensive actions and counterattacks against a symmetric, in this case mechanized, enemy. The study does not adequately address a case against an asymmetric, i.e. manpower intense or human wave, adversary or a more static type defense. The study concludes, "First, landmines do have military utility in high intensity mechanized land warfare....In any event, however, it is clear that the assumed balance of offense and defense has a major impact on the net military utility of landmines -- and the results here suggest that it is only when the U.S. fights mostly or entirely defensive actions that this utility approaches the magnitudes usually cited in the public debate (e.g., arguments that the absence of landmines could double U.S. losses)."<sup>27</sup> The study further concludes that, "...the results here suggest that 'asymmetric' substitutes like increased numbers of direct fire systems (such as M2A2 Bradleys or M1 tanks), or improved artillery fire effectiveness...might

compensate for the effects of landmines at lower cost, even though their effects do not immediately resemble those of a minefield."<sup>28</sup>

IDA's conclusion that additional and more accurate firepower provide an alternative to landmines in defensive operations is limited to a case assuming mechanized US forces oppose a mechanized enemy force and are able to conduct numerous tactical offensive actions as part of the operational defense. The IDA study is also flawed because it fails to address a range of other significant operations involving the employment of landmines.

US forces may not always be able to "balance" some tactical offensive actions in the operational defense. More static defensive operations designed to defeat very determined attacks, such as the Germans faced from the Allied forces in Western Europe, must integrate all available combat power to halt and destroy enemy forces. Defensive minefields on this scale can be associated with attrition warfare, which is an unlikely but still possible military option for US forces. While added and more accurate firepower might serve as an alternative in shaping the movements of and attriting enemy forces, it probably does not adequately serve to retain key terrain. In this case, a very static defense against determined attack, the operational commander must rely not only on increased lethality but also on additional mass as an alternative to landmines as a means. If these means were unavailable the commander would be forced to change the operational scheme to a more dynamic defense or a delaying defense.

The employment of landmines in the more dynamic defense between symmetric opponents, as in the IDA study and in North Africa or Desert Storm, has not proven operationally significant. Employment of landmines has been especially important in cases where relatively small US forces opposed a numerically superior and asymmetric threat, as against Communist forces in Korea. In this case, added and more accurate firepower would provide only part of an alternative. The numerically inferior US forces could rely on increased lethality to attrit the hoards of enemy forces but may not be able to adequately shape their movements or provide close in protection from the shock of the assault. Additional mass would obviously support the US defense, but increased and more agile tactical maneuver are more logical alternatives.

The use of landmines in delaying operations has proven more successful than in the defense, and a delaying defense can be considered a viable alternative to the attrition type. In 1994, the International Committee of the Red Cross sponsored a symposium of military experts to examine the utility of mines. This group concluded that, "Anti-personnel mines are very effective in creating delay, canalising and disrupting the efforts of the enemy."<sup>29</sup> It is significant that this group of experts concluded that landmines are effective in delaying enemy forces as opposed to stopping them. Additionally, the group concluded, "...that 'no alternative fulfills the military requirement in the way that antipersonnel ...mines do...'"<sup>30</sup> The "military requirement" referred to is a means to create delay by shaping and disrupting the enemy's movements. The conclusion that landmines are very effective in creating a delay is justified by historical evidence, but the study does not go far enough in describing effective alternatives. Viable alternatives in this case could include greater and more accurate firepower to create delay by shaping and disrupting the enemy's movements. More agile tactical maneuver could also provide an alternative.

By omission the IDA study treats landmines employed in offensive operations as non-essential if not insignificant. While this view is historically justified it is not doctrinally correct. By doctrine, offensive operations require an agile use of landmines to shape enemy movement and protect friendly formations. Alternatives especially well suited to the agility required in the offense include greater and more accurate firepower and greater speed of operational and tactical maneuver.

The IDA study completely ignores operations other than war, in which landmines have most significantly been employed along a fixed barrier for deterrence or to add credibility during a build-up of forces. The most effective employment of landmines has been for deterrence along fixed barriers, as along the DMZ in Korea, and these circumstances are also the most difficult under which to identify an alternative. Any additional combat power deployed as alternative to landmines might be viewed as offensive in nature, provocative and thus ineffective in deterrence. Effectively communicated resolve to deploy additional forces as

required may not be viewed as credible, even with demonstrated improvements in strategic mobility. The alternative in this case seems to rely on significant policy level actions. An obvious alternative to the employment of landmines during a build-up of forces is to shorten the length of time that US forces are exposed by expanding and improving strategic mobility. Another alternative in this case is to focus early deployment efforts on smaller but more highly lethal force packages.

#### CONCLUSION: THE RISK OF A LANDMINE BAN

"Q In the modeling of Korea, if you remove the land mines, would that require the infusion of more U.S. troops to defend?

SR. MILITARY OFFICIAL: It would require the infusion of more troops -- Q How many?

SR. MILITARY OFFICIAL: -- more forces. Can't give you the numbers. But even doing that, with more troops and with more numbers, you wind up with thousands of additional casualties that you did not have." DOD Brief<sup>31</sup>

Since World War II, US forces have gained considerable experience in the employment of landmines in war and operations other than war. Landmines are integrated into the tactics, techniques and procedures trained by the armed services. Now, because of the indiscriminate killing and maiming effects of these weapons, policy makers are committed to a global ban on most categories of antipersonnel landmines. A debate has developed in the professional and academic journals over the utility of landmines in military operations from one perspective versus the necessity of a landmine ban for humanitarian reasons from the other. The key to successfully reconciling these perspectives resides at the operational level of war, because it is at the operational level that available military means are applied to achieve strategic ends. The operational commander is the key to reconciling the tactical utility of landmines with a strategic ban on their use, and, in the process, identifying the risk associated with the reconciliation.

In most of the cases where the operational scheme includes effective employment of landmines, an alternative means within the operational scheme or alterations to the scheme can be identified and applied toward the same end. One study (IDA) concludes that additional and

more accurate firepower provide an alternative to landmines in defensive operations. The scheme, defensive operations, in this study, however, is limited by assumptions that a mechanized US force opposes a mechanized enemy force and are able to conduct numerous tactical offensive actions as part of the operational defense. Other alternatives may be required as the threat becomes more asymmetric or the defense becomes more static. Additional and more accurate firepower as well as more agile tactical mobility provide viable alternatives when the operational scheme involves a delay, and the delay provides an alternative operational scheme to the fixed defense. Landmines employed along fixed barriers have been particularly effective in deterrence, and policy level action may provide the most viable alternative to their use.

While an operational analysis of the impact of a landmine ban can identify alternative mechanisms, none of these alternatives are without associated risk. An additional part of the operational commander's responsibility in reconciling the tactical utility of landmines with a ban on their use is to identify the risks incurred by constraining or altering the operational scheme. In some cases, altering the force ratios effectively compensates for the constraint. In many cases, however, improved capabilities or even policy decisions may provide the most viable alternatives. In every case, when landmines are removed from the operational equation some degree of risk must be identified and accepted. "Military experience is that the use of mines in defence reduces the number of casualties to own troops. Studies and war game modeling support these findings."<sup>32</sup>



## NOTES

- <sup>1</sup> Gerard Gambiez, "Should We Fear Mine Warfare?" (Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1989).
- <sup>2</sup> Department of the Army. Mine/Countermining Operations. (FM 20-32) (Washington: 1992), 1-10.
- <sup>3</sup> President, Proclamation, "Remarks to the 51st Session of the United Nations General Assembly in New York City." Weekly Compilation of Presidential Documents (September 1996), 1843-1847.
- <sup>4</sup> Warren M. Christopher, "Hidden Killers: U.S. Policy on Anti-Personnel Landmines," DISAM Journal, Summer 1995, 81.
- <sup>5</sup> "Landmines: The Real Weapons of Mass Destruction." Defense Monitor, July 1996, 1-7.
- <sup>6</sup> Joint Chiefs of Staff. Doctrine for Joint Operations. (Joint Pub 3-0) (Washington: 1 February, 1995).
- <sup>7</sup> Joint Chiefs of Staff. Doctrine for Barriers, Obstacles, and Mine Warfare. (Joint Pub 3-15) (Washington: 30 June, 1993).
- <sup>8</sup> Ibid., II-5.
- <sup>9</sup> Ibid., II-4.
- <sup>10</sup> Ibid., I-2.
- <sup>11</sup> Kevin Cahill, ed., Clearing the Fields: Solutions to the Global Land Mines Crisis. (New York: BasicBooks, 1995), 33.
- <sup>12</sup> Ibid.
- <sup>13</sup> Russel H. Stolfi, Mine and Countermining Warfare in Recent History, 1914-1970. (BRL Report Number 1582. Aberdeen: 1972), 18.
- <sup>14</sup> Kevin Cahill, ed., Clearing the Fields: Solutions to the Global Land Mines Crisis. (New York: BasicBooks, 1995), 37.
- <sup>15</sup> Russel H. Stolfi, Mine and Countermining Warfare in Recent History, 1914-1970. (BRL Report Number 1582. Aberdeen: 1972), 50.
- <sup>16</sup> Ibid.

- <sup>17</sup> Ibid., 103.
- <sup>18</sup> Eric Prokosch, The Technology of Killing: A Military and Political History of Antipersonnel Weapons. (London: Zed Books Ltd, 1995), 6.
- <sup>19</sup> Ibid., 32.
- <sup>20</sup> Ibid., 107.
- <sup>21</sup> Kevin Cahill, ed. Clearing the Fields: Solutions to the Global Land Mines Crisis. (New York: BasicBooks, 1995), 37.
- <sup>22</sup> Christopher Smith, "Anti-Personnel Mines: The Arguments Over Military Utility." Brassey's Defence Yearbook 1996, 1996, 280.
- <sup>23</sup> Institute for Defense Analyses. The Military Utility of Landmines: Implications for Arms Control. D-1559. (Alexandria, VA: 1994), 18.
- <sup>24</sup> Ann Peters, "Landmines in the 21st Century." International Relations, August 1996, 41.
- <sup>25</sup> Kevin Cahill, ed. Clearing the Fields: Solutions to the Global Land Mines Crisis. (New York: BasicBooks, 1995), 32.
- <sup>26</sup> Russel H. Stolfi, Mine and Countermine Warfare in Recent History, 1914-1970. (BRL Report Number 1582. Aberdeen: 1972).
- <sup>27</sup> Institute for Defense Analyses. The Military Utility of Landmines: Implications for Arms Control. D-1559. (Alexandria, VA: 1994), 69.
- <sup>28</sup> Ibid., 70.
- <sup>29</sup> Ezio Bonsignore, "Land Mines- No More?" Military Technology, April 1994, 72.
- <sup>30</sup> Kevin Cahill, ed. Clearing the Fields: Solutions to the Global Land Mines Crisis. (New York: BasicBooks, 1995), 38.
- <sup>31</sup> Federal News Service. "Special Defense Department Background Briefing." (Federal Information Systems Corporation, 16 May 1996).
- <sup>32</sup> Ezio Bonsignore, "Land Mines- No More?" Military Technology, April 1994, 72.

## Bibliography

- Anderson, Kenneth and Monica Schurtman. "The United Nations Response to the Crisis of Landmines in the Developing World." Harvard International Law Journal, Spring 1995, 359-371.
- "Arms Control." Foreign Policy Bulletin, November-December 1994, 67-72.
- Bonner, Raymond. "Land Mine Treaty Takes Final Form Over U.S. Dissent." The New York Times, 18 September 1997, p. 1:6.
- \_\_\_\_\_. "Other Nations Call New U.S. Terms for Mine Ban Unacceptable." The New York Times, 16 September 1997, p. 1:11.
- \_\_\_\_\_. "U.S. in Last-Ditch Effort to Save Treaty Banning Mines." The New York Times, 17 September 1997, p. 1:6.
- Bonsignore, Ezio. "Land Mines- No More?" Military Technology, April 1994, 68-72.
- Boschmann, Peter. "The Mobile Barrier: Land Mine Warfare in the 90s." NATO'S Sixteen Nations, July 1986, 54-59.
- Buchanan, Nancy. "Mine Warfare from a Different Perspective." Armada International, February-March 1995, 20+.
- Cahill, Kevin, ed. Clearing the Fields: Solutions to the Global Land Mines Crisis. New York: BasicBooks, 1995.
- Christopher, Warren M. "Hidden Killers: U.S. Policy on Anti-Personnel Landmines." DISAM Journal, Summer 1995, 81-84.
- Cook, Frank. The Land-Mine Crisis: A Growing Epidemic. Report to the (U.K.) Sub-Committee on the Future of the Armed Forces. London: May, 1995.
- Crossette, Barbara. "Pact on Land Mines Stops Short of Total Ban." The New York Times, 4 May 1996, p. 1:4.
- Curtis, Ian G.S. "Today's Battlefield Mobility Gives New Importance to Battlefield Engineering." Defense & Foreign Affairs, December 1990, 22-24.
- DePalma, Anthony. "As U.S. Looks On, 120 Nations Sign Treaty Banning Land Mines" The New York Times, 4 December 1997, pp. 1:5-6.
- Fanta, Peter J. "Sea Mines at the Operational Level." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1995.

- Federal News Service. "Special Defense Department Background Briefing." Federal Information Systems Corporation, 16 May 1996.
- Gambiez, Gerard. "Should We Fear Mine Warfare?" Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1989.
- Gill, Clair F. "Clear the Way (U.S. Anti-Personnel Landmine Policy)." Engineer, December 1996, cover.
- Green, Bryan. "Alternatives to Antipersonnel Mines." Engineer, December 1996, 11-13.
- Hewish, Mark. "Land Mines: Cheap and Effective Area Adenial." International Defense Review, August 1986, 1085-1091.
- Institute for Defense Analyses. The Military Utility of Landmines: Implications for Arms Control. D-1559. Alexandria, VA: 1994.
- "Landmines: The Real Weapons of Mass Destruction." Defense Monitor, July 1996, 1-7.
- Matheson, Michael J. and Stephen D. Goose. "In Pursuit of a Global Ban on Landmines." Arms Control Today, July 1996, 9-17.
- Peters, Ann. "Landmines in the 21st Century." International Relations, August 1996, 37-50.
- Project on Demilitarization and Democracy. Making the World Unsafe for Landmines: A Timetable for Developing Military Alternatives and Implementing a Worldwide Ban on the Smallest Weapon of Mass Destruction. Report to the U.S. Department of State. Washington: August, 1996.
- Prokosch, Eric. The Technology of Killing: A Military and Political History of Antipersonnel Weapons. London: Zed Books Ltd, 1995.
- Sanger, David E. "U.S., in Shift, Says It May Sign Treaty to Ban Land Mines." The New York Times, 15 September 1997, p. 1:6.
- Shenon, Philip. "Clinton Still Firmly Against Land-Mine Treaty." The New York Times, 11 October 1997, p. 1:6.
- \_\_\_\_\_. "Joint Chiefs Weaken Proposal for Land-Mine Moratorium." The New York Times, 11 May 1996, p. 1:4.
- Sinn, Jerry L. "Land Mine Options in Future Crisis and Conflicts" Unpublished Research Paper, U.S. Army War College, Carlisle Barracks, PA: 1987.

- Sloan, C. E. E. Mine Warfare on Land. London: Brassey's Defence Publishers, 1986.
- Smith, Christopher. "Anti-Personnel Mines: The Arguments Over Military Utility." Brassey's Defence Yearbook 1996, 1996, 273-285.
- Stolfi, Russel H. Mine and Countermine Warfare in Recent History, 1914-1970. BRL Report Number 1582. Aberdeen: 1972.
- Strada, Gino. "The Horror of Land Mines." Scientific American, May 1996, 40-45.
- United Nations. General Assembly. Resolution Adopted by the General Assembly, 51/149. Assistance In Mine Clearance. February 1997.
- U.S. Department of the Army. Mine/Countermine Operations. (FM 20-32) Washington: 1992.
- U.S. Department of State. "Fact Sheet: U.S. Proposals to Improve the Landmines Protocol of the Convention on Conventional Weapons." Volume 6, Number 39. Washington: 25 September, 1995.
- \_\_\_\_\_. "U.S. Initiatives for Demining and Landmine Control." Volume 6, Number 6. Washington: 6 February, 1995.
- "U.S. Is Alone in Seeking Loophole in Ban on Mines." The New York Times, 3 September 1997, p. 1:10.
- U.S. Joint Chiefs of Staff. Doctrine for Joint Operations. (Joint Pub 3-0) Washington: 1 February, 1995.
- U.S. Joint Chiefs of Staff. Doctrine for Barriers, Obstacles, and Mine Warfare. (Joint Pub 3-15) Washington: 30 June, 1993.
- U.S. President. Proclamation. "Remarks to the 51st Session of the United Nations General Assembly in New York City." Weekly Compilation of Presidential Documents, September 1996, 1843-1847.
- Wurst, Jim. "Closing in on a Landmine Ban: The Ottawa Process and U.S. Interests." Arms Control Today, June/July 1997, 14-18.
- Wyatt, J. R. "Land Minewarfare: Recent Lessons and Future Trends." International Defense Review, November 1989, 1499-1506.